PROGRESS REPORT

NASA ORDER NO. R-39

CONDUCT RESEARCH ON THE EFFECTS OF VERY STRONG MAGNETIC FIELDS AND OF MAGNETIC FIELD-FREE ENVIRONMENTS ON MAN AND ANIMALS

Prepared for Biotechnology and Human Research Division, Code RB
National Aeronautics and Space Administration Headquarters

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A. Biological effects of strong magnetic fields.

1. Superconducting magnet.

The magnet minus power supply has been accepted from Gardner Cryogenics Corporation. Our Electronics Division is at present constructing a power supply system which should be superior to any system presently on the market. The magnet will be in operation for physiological experimentation in the near future. A report on the new power supply will be prepared upon its completion.

2. Nerve excitability.

Preliminary evaluation of data from frog sciatic nerve exposed to the field of a conventional electromagnet (13 kilogauss) indicates that there may be both a decrease in conduction velocity and an increase in the amplitude of the action potential following exposure to the field. Agents known to block specific components of the nerve impulse will be used to verify and more completely characterize these effects of the field. Upon completion of the power supply for the superconducting magnet it will be possible to extend these studies to fields which reach slightly above 100 kilogauss. Under these conditions it is anticipated that the observed effects will be increased.

3. Studies of primates in high magnetic fields.

A chimpanzee is prepared for exposure in a new 20-inch superconducting magnet at NASA Lewis Research Center, Cleveland, Ohio. Dr. Ross Adey,

Brain Research Institute, Los Angeles, will cooperate in the EEG studies, Dr. N. Allebach, Chief Cardiologist, NAMI, Pensacola, will serve as consultant in the ECG evaluation and Dr. Thach, Head, Animal Behavioral Sciences Branch, NAMI, Pensacola, will make performance studies during exposure of the animal to the high magnetic field. The experiment will take place in June or July of this year. It will serve as a last step in preparation for human exposure.

B. Null magnetic field environment.

Two human subjects are at present in the process of being exposed to a magnetic field of 50 gamma in the shielded room in Pensacola. The electrocardiogram, body temperature and sodium as well as potassium in the urine are determined in 4-hour intervals. Flicker-fusion, reaction time, visual acuity, and visual threshold are determined twice daily. New, completely automatic methods have been designed for these determinations which render results free of observer error. The experiment will be concluded on May 3 and results will be available soon after this date.

About 12 human subjects will be exposed to similar conditions during the summer and an experiment in the coil system of NOL in Silver Spring has been scheduled for December 1969.